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(M. S. DE VRIES) between 5° and 25° C.; protoplasmic streaming in *Elodea* (VELTON) between 2°5 and 35° C.; permeability of plant cells and tissues (RYSSELBERGHE) between 0° and 30° C.; intake of water by barley grains (BROWN and WORLEY) between 3°8 and 34°6 C., etc. Among the processes in animals showing a Van't Hoff temperature coefficient are the following: heart beat frequency, pulsation of medusae, rhythmic muscular contraction, peristaltic movement of cat intestine, rhythm in frog stomach, breath frequency, propagation of nervous stimulus, latent time of muscle, rate of cell division in *Paramecium*, generation period of certain bacteria, pupation period, rate of oxygen consumption, etc.

Some high values of Q_{10} are found, especially in relation to life duration and coagulation effects of temperature. Thus, in life duration of sea urchin eggs, $Q_{10}=240$ to 1450; of *Tubularia crocea*, $Q_{10}=485$ to 3900; of barley grains, $Q_{10}=10$ to 16; of spores of certain bacteria, $Q_{10}=8$, 15, 30, 50, or even 320. In denaturing haemoglobin, $Q_{10}=14$; and in precipitation of egg white, $Q_{10}=635$. Some processes that give normal values of Q_{10} within a certain temperature interval show high values of Q_{10} at the lower or critical temperatures. Thus, in CO_2 assimilation, $Q_{10}=28.7$ from $-6°$ to 0° C.; in heart frequency, $Q_{10}=13.7$ from 3°2 to 8°4; in geotropic presentation time, $Q_{10}=20$ from 0° to 5°; in protoplasmic streaming in *Vallisneria*, $Q_{10}=14.7$ from 1°25 to 3°75.

KANITZ brings out more clearly the relation of temperature to life processes by recalculating Q_{10} at the various temperature intervals, instead of indicating only the average coefficient for a long temperature range. When this is done, it is found that in many cases Q_{10} is not a constant at all intervals of temperature. Many processes show falling values of Q_{10} at higher temperatures, for example, CO_2 assimilation, respiration of seedlings, permeability of plant cells, etc. Some processes, however, show a temperature interval at which Q_{10} is constant. In general, in plants the range of temperature within which Q_{10} may be constant begins at 5° C. and ends at approximately 25° C. The rapidity of division of *B. coli* shows two temperature regions with constant coefficients, but with different coefficient values. Investigators should follow KANITZ in this regard, and should calculate Q_{10} for each temperature interval for which data are available.—F. E. DENNY.

Heredity and environment

One of the notable recent books in the general field of genetics is that of CONKLIN,[2] which is a series of lectures delivered at Northwestern University on the "Norman W. Harris Foundation." The author has been unusually successful in maintaining a clear and popular style without any appreciable sacrifice of scientific values. The book departs from the usual type of textbook in genetics in several respects. In the first place, great emphasis is placed

[2] CONKLIN, E. G., Heredity and environment in the development of men. 8vo. pp. xiv+533. Princeton University Press. 1915.

upon the environmental and functional factors of development as opposed to the heredity factors proper. In his zeal to point out the fact that geneticists have neglected the environmental factors, the author tends to overemphasize its relative value in development and heredity. Again, his point of view conflicts with the usual genetical conception of the physical basis of heredity in that he strongly emphasizes the cytoplasmic as opposed to the nuclear elements in germ cells. He points out "that at the time of fertilization the hereditary potencies of the two germ cells are not equal, all the early stages of development, including the polarity symmetry, type of cleavage, and pattern or relative positions of future organs, being foreshadowed *in the cytoplasm of the egg cell*, while only the differentiations of later development are influenced by the sperm. In short, the egg cytoplasm fixes the general type of development and the sperm and egg nuclei supply only the details." Has the author intended to deny to the sperm a cytoplasmic organization, which might conceivably have something to do with development and heredity?

Another distinctive feature of the book is the humanistic point of view that is maintained throughout. As the title indicates, *man* is the center of interest, and the author views man broadly, neglecting none of his salient qualities. Not only is the physical development and heredity of man discussed, but a similar attempt is made to correlate with the physical side that side which we usually term the mental and spiritual. With some boldness the author, in his final chapter entitled "Genetics and ethics," invades ground that even angels might fear to tread. Such questions as "the voluntaristic conception of nature and of human responsibility," "the determinism of environment," and "responsibility and will" are handled with confidence, and certain conclusions are reached and stated, in spite of our lack of a factual and experimental basis for any such conclusions.

The 6 chapters of the book may be characterized as follows. "Facts and factors of development" includes a discussion (1) of the phenomena of development of body and of mind, and (2) of the factors of development (preformation and epigenesis, heredity and environment). The second chapter, entitled "The cellular basis of heredity and development," and the first, previously cited, are decidedly the best in the book, as might be expected in view of the author's special attainments in this field. The reviewer knows no better treatment of these important matters, although he is unable to agree with some of the author's most fundamental positions. The third chapter, "The phenomena of inheritance," is a clear, though brief, statement of the facts, observation, statistical, and experimental, that make up the body of our modern knowledge of heredity. In the fourth chapter, entitled "Influence of environment," the author has an axe to grind and does it with thoroughness. Environment and functional activity as factors in development are given a place as important as heredity. While possibly somewhat overstated, this position is one that needs to be borne in mind, and this chapter will go far toward reinstating the factors of environment and functioning in the estimation of the student of

development and heredity. The fifth chapter, dealing with the "Control of heredity: eugenics," is a somewhat conventional treatment of an important subject. The sixth chapter, entitled "Genetics and ethics," has been commented upon previously.

A useful bibliography, glossary, and index complete the volume, which, though possibly not so well adapted as some for textbook use, is, in the reviewer's opinion, probably the best presentation of genetics for the non-scientific reader.—H. H. NEWMAN.

Bacteria and plant diseases

The third volume of SMITH'S[3] *Bacteria in relation to plant diseases* continues the treatment of the vascular diseases which was begun in the second volume with a discussion of the wilt of cucurbits, the black rot of crucifers, and the yellow disease of hyacinths. In the present volume a full treatment is accorded Cobb's disease of sugar cane, Stewart's disease of sweet corn, the Grand Rapids tomato disease, the brown rot of the Solanaceae, and the wilt diseases of tobacco. These diseases have been extensively investigated by the author himself. The accounts, therefore, contain not only a complete and critical discussion of the literature, but also embody the author's own results and present his viewpoint at the time of the writing.

In addition to these diseases, to which the greater part of the volume is devoted, a number of diseases of minor importance, or such as have not been seen by the author, or whose right to be classed as bacterial diseases has not been definitely established, are considered. Among these may be mentioned several diseases of the sugar cane, some of which are probably identical with Cobb's disease, a disease of amaranths, a wilt of the peanut, a disease of orchard grass, various vascular diseases of the banana, and two diseases of the potato. The status of many of these is still obscure. That some of them, as the various diseases of the sugar cane and the many wilts of tobacco and other solanaceous plants, are not all distinct is the belief of the author, but, in accordance with his custom, each disease independently described is kept separate until its identity shall have been established.

The book may well be said to be a record of the present status of our knowledge of the diseases of which it treats. At the same time it bears internal evidence in the many changes during the making that this status is rapidly shifting. By bringing together and classifying the vast mass of scattered and fragmentary facts relating to the subject, the author has laid bare the gaps in our knowledge and has thus pointed the way for further research. Many gaps have been filled by the author's own work, but that much remains to be done before even the morphological and etiological phases of the subject shall have been cleared up is shown by a glance through the chapters on the brown

[3] SMITH, ERWIN F., Bacteria in relation to plant diseases. Vol. III. pp. viii+309. *pls. 47. figs. 138.* Washington, D.C. 1914.